551.465.63 : 551.524 (048) NOTES, ABSTRACTS, AND REVIEWS

A COMPARISON OF HYDROLOGICAL AND METEOROLOGICAL DATA

By Prof. V. I. PETTERSSON

[Condensed from Meteorological Magazine of October, 1926]

Professor Pettersson in a lecture at the reunion of the International Council of Exploration of the Sea in September, 1925, in Copenhagen [1] compares the hydrographical statistics of the surface temperature of the sea for the 14 years 1900–1913, with meteorological data for the same period. It is shown that there exists a fair relation between the mean annual air temperature of oceanic islands, such as Madeira, and the surrounding ocean, a correlation coefficient of +0.86 being obtained for the values for Madeira and the sea some 35 miles to the northeast.

The path of the Gulf Stream was studied by reference to the temperature of adjacent sea areas, whence it appears the Gulf Stream drift divides south of Newfoundland into two portions, one going to the north toward Greenland, and the other to the east (south of 40°) to the west coast of Europe. It also appears that the northerly branch has a seasonal flow, the excess temperature over surrounding areas disappearing in January.

The Gulf Stream itself shows variations of temperature from year to year but the correlations of these variations with the temperature of western Europe is nil.

Professor Pettersson estimates the annual variation of the amount of melting ice by comparing the average departure of the water temperature from the mean temperature in the summer months to the east of Newfoundland. The warmer or colder surface water spreads eastward from this zone of melting ice, as part of the Atlantic drift current to the shores of Europe. It is estimated that this water will arrive 12 or 14 months later. The correlation coefficient between the surface temperature in summer of the area in which the ice melts and the mean annual temperature of the water in the ocean midway between Newfoundland and Ireland in the following year (i. e., six to eight months later) is found to be +0.45.

The variations of the mid-Atlantic temperature are reproduced in the variations in the rainfall of Ireland in the following year, a correlation coefficient of +0.64 being obtained from the data for the years 1900–1913. It is further shown that the general rainfall values for Ireland, Great Britain, Spain, and Sweden are very similar. Thus there is some evidence for suggesting that the rainfall of western Europe is determined by the temperature of the sea on the other side of the Atlantic one or two years earlier.

Professor Pettersson points out that this is a preliminary discussion and that larger series of observations and more accurate measurements of the water temperature by automatic recording instruments are required.—*A. J. H.*

[1] Etude de la Statisque Hydrographique du Bulletin Atlantique du Conseil International pour L'Exploration de la Mer. Svenska Hydrog.-Biol. Komm. Skri. New Series. No. 1 Göteborg, 1926.

TEMPERATURE RELATIONS BETWEEN CERTAIN MONTHS IN DIFFERENT YEARS

551.506 : 551.524 (048)

In *Comptes Rendus* for November 8, 1926, page 802, Louis Besson presents the results of calculations bearing on this matter. By plotting the sums of the accumulated monthly departures from normal of April and of July, with the July values on the same abscissa as the April value seven years previous, for Paris, the author obtains two curves which in their broad features show remarkable parallelism. The correlation coefficient stating this relation is 0.817 ± 0.021.

Computing the correlation coefficient between the actual monthly means, April of a given year and July seven years later, 0.404 ± 0.052 was obtained. Calculation shows that the chance of this relation being fortuitous is but one in a million. The relations have persisted throughout the 117 years of record analyzed. For the first 48 years, $r = 0.458 \pm 0.077$, and for the 69 later years $r = 0.362 \pm 0.071$.

The lag of 7 years was determined upon after calculation of the coefficients between April and July means for lags of 0 years to 9 years showed the maximum difference of phase at 7 years. A strong departure in April has usually been followed by a strong departure of the same sign in July seven years later.

The relation indicated for Paris is still more striking for Strasbourg and almost as much so for Nantes. It is present at Vienna, but toward the north it fades out rapidly, and even more rapidly toward the south.

Two less pronounced relations also emerge from the Paris record, namely, that May temperature varies, in its broad outlines, as that of December eight years before, while November temperature varies inversely as January temperature six years before.—*B. M. V.*

551.571 (048)

DISTRIBUTION OF HUMIDITY IN THE ATMOSPHERE

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[Reprint of Science Abstracts No. 2548, sec. A, Physics, November 25, 1926]

(Met. Zeit., 43, pp. 253–256, July, 1926).—From the published aerological soundings on international days, 1905–1912, values have been extracted and annual means calculated for the relative humidity up to 20 kilometers over Hamburg, Lindenburg, Uccle, Strasburg, Munich and Pavia. Mean values for all six stations are also found, and it is noted that for all parts the relative humidity, r, decreases with height. Between the surface and 3 kilometers the mean decrease is 37 per cent in winter, 35 per cent in autumn, 16 per cent in spring, and 13 per cent in summer. It was considered possible to separate four zones: (1) Surface, 1 kilometer, where the condensation processes are most frequent; (2) 1 to 4 kilometers, with condensation processes less frequent, less vapor and smaller temperature gradient; (3) 4 to 11 kilometers, with a balance between the ordinary decrease of r with height and the large temperature decrease, and thus r is almost constant; and (4) above 11 kilometers, where temperature begins to rise, but results do not show an increase of r. Hergesell's formula for the change of r with height applies only to the second zone. A preliminary survey was made for the variation of r with height in different parts of an anticyclone and a depression. For the latter r decreases at very different rates in the several quadrants. Finally, absolute values are calculated for r, and the temperature for five stations, and these values tabulated for all heights up to 10 kilometers. The greatest change occurs from the surface to 2 kilometers, while above 5 kilometers the change is very slow, as values are so small. A comparison of these results with those calculated from formulae given by Süring and by Hergesell shows that the former's expression is more accurate.—*R. S. R.*